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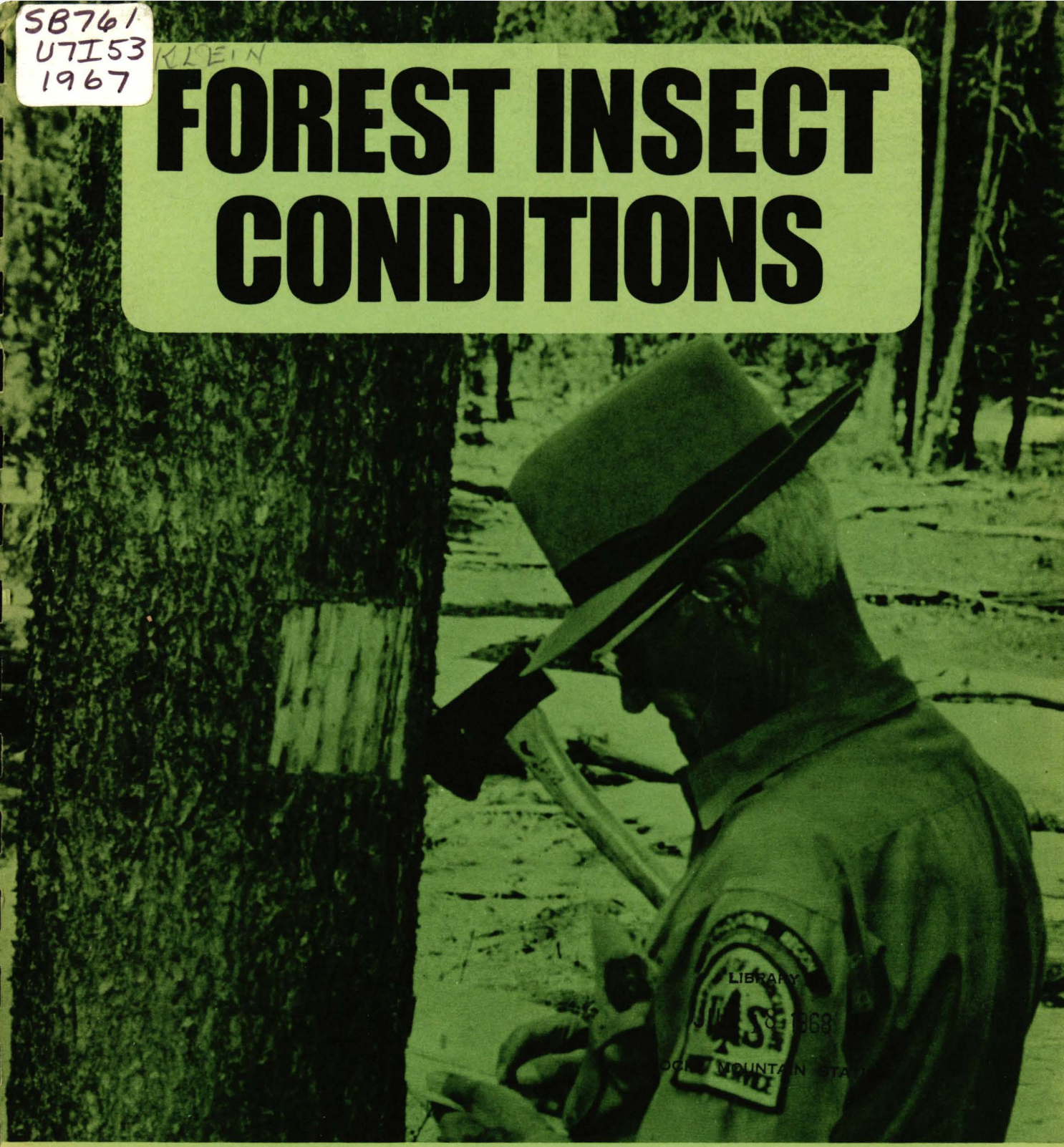
FOREST INSECT CONDITIONS



in the Intermountain States during 1967

BRANCH OF FOREST INSECT AND DISEASE PREVENTION AND CONTROL
DIVISION OF TIMBER MANAGEMENT
REGION FOUR / FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE
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COVER STORY

In recent years regional entomologists have been field testing a method for evaluating mountain pine beetle populations in lodgepole pine. This method is based on the assumption that numbers of live mountain pine beetle brood are indicative of trend. Briefly, the mechanics of the method entails making systematic brood counts from fixed-sized bark samples (see cover), accumulating the counts sequentially, and comparing them to a prediction table. Sequential tables have been prepared for fall, spring (April and May), and summer (June and July) broods. Because of the urgency to know the status of the population and its potential as far in advance as possible, emphasis has been on fall sampling. Entomologists have now accumulated fall brood data over a 4-year period, from hundreds of areas and from thousands of trees, and have had an opportunity to correlate the results with the predictions. It is now known that predictions of one generation to another, based entirely on fall brood counts, and made so far in advance, are subject to errors if not considered with other biological entities that affect brood survival and trend. These intrinsic and extrinsic factors include the presence and relative abundance of parasites, predators, and disease; the apparent brood vitality; the presence and relative abundance of competitive beetles, such as ips; tree diameter; attack and pitchout ratios; stand structure, including the availability of host material; the age of the infestation; the size and number of group attacks; and others. These factors, considering our present understanding of the population dynamics of the mountain pine beetle, cannot be plugged into a table or reduced to simple formulae; rather, they must be considered in toto and tempered with sound entomological experience and judgment.

FOREST INSECT CONDITIONS IN THE INTERMOUNTAIN STATES DURING 1967

By

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April 1968

Branch of Forest Insect and Disease Prevention and Control

Division of Timber Management

Region Four Forest Service

U.S. Department of Agriculture

Ogden, Utah

TABLE OF CONTENTS

Subject	Page
Resumé of Conditions	1
Bark Beetles	
Mountain pine beetle - Lodgepole pine	4
Mountain pine beetle - Ponderosa pine	7
Douglas-fir beetle	7
Engelmann spruce beetle	8
Western pine beetle	9
Pine engravers (*Ips* spp.)	9
Fir engraver beetles	10
Roundheaded pine beetle	10
Defoliators	
Spruce budworm	11
Sugar pine tortrix	13
Tent caterpillars	14
Black-headed budworm	15
A looper	15
A sawfly	16
White fir needle miner	17
Tussock moths	17
A spruce mealybug	17
Other Insects	
A terminal weevil	18
Grass plant bug	18
Forest Diseases	
Dwarfmistletoe	19
Fomes annosus	19
White pine blister rust	20
Map	
Distribution of Major Forest Insects	Appendix

RESUMÉ OF CONDITIONS

With only minor exceptions, forest insect problems in the Intermountain Region are considerably under the high levels of past years. One important exception to this, however, is the widespread and relentless destruction of lodgepole pine by the mountain pine beetle in portions of southern Idaho and western Wyoming and to a lesser extent in northern Utah. It appears, however, that the infestation peak has been finally reached and the culmination of massive tree killing, although still far in the future, is in sight. The spectacular outbreak in the Jackson Hole country, including the unchecked infestation in the Teton Wilderness, has abated and, with few exceptions, will continue to maintain its present rate of decrease. Persistent control efforts have slowed the infestation down in some areas on the Targhee National Forest but failed to prevent a significant buildup in the southwest corner of Yellowstone National Park. With the exception of the infestations on the Rexburg and Spencer Districts which have already declined, tree killing will increase measurably in all other areas of the Targhee infestation.

On the Bridger National Forest, natural factors reduced the longstanding infestation in the Greys River drainage of the Bridger Division but had little effect in curbing the anticipated buildup along the western fringe of the Bridger Wilderness. Here, heavy depredation of lodgepole pine in localized areas seriously threatens important recreation and timber values. The persistent infestation in Warm Springs Creek and in other areas of the Sawtooth National Forest continues unchecked. Heavy tree killing continued for the third straight year on the Caribou National Forest, but indications point to reduced activity in 1968. Widely scattered group killing of a decreasing nature continued on the Cache National Forest with only negligible activity showing up in past infestations on the Ashley and Wasatch National Forests.

A slight upsurge of the mountain pine beetle occurred in one location common to the Dixie National Forest and Bryce Canyon National Park and in another area on the Ashley Forest. The persistent infestation in second-growth ponderosa pine near Cascade, Idaho, continues unabated with no letup expected in the immediate future.

A buildup of the Engelmann spruce beetle that escaped detection for several years was finally discovered in scattered locations near Hilgard Mountain on the Fishlake National Forest. The full extent of this outbreak, which appears to be restricted to inoperable areas, will not be known until the areas become accessible for ground surveys in summer of 1968. On the Payette National Forest a trap tree program will be initiated in the spring of 1968 in an attempt to lure emerging spruce beetles from heavily infested roadside logs in the Hazard Lake area.

Douglas-fir beetle, reared from scattered windthrow, attacked standing trees over a wide area in southern Idaho. Treating or burning infested

slash will preclude green tree attacks in one old sale area on the Challis National Forest. Elsewhere, Douglas-fir beetle populations are at an exceptionally low level.

A reduction in the number of infested trees per group indicates a possible decline in ips populations throughout young ponderosa pine stands in southern Idaho. On the Dixie Forest, treatment of several hundred mature ponderosa pine infested by the western pine beetle has reduced the likelihood of the outbreak developing anew in 1968. The depletion of true firs by engraver beetles and other factors reached its lowest level in years.

The longstanding spruce budworm outbreak in southern Idaho, which covered more than two million acres in 1964, dropped to less than a quarter million acres in 1967. Douglas-fir-true fir stands which suffered repeated defoliation year after year, particularly those on the Salmon, Challis, and Boise National Forests, experienced only light feeding in relatively small, widely separated areas. The Sawtooth infestation, known for its fluctuating populations, declined to a low level as did the once threatening outbreaks on the Targhee and Fishlake Forests. The only significant increase in budworm activity was on the Bridger Forest where the infestation intensified in existing areas and extended its boundaries to include portions of the neighboring Teton and Targhee National Forests. Defoliation is expected to become more extensive and severe in 1968 but not to the extent that control will be needed. Elsewhere in the Region, budworm populations will remain static or increase slightly.

The distribution of the sugar pine tortrix in lodgepole pine remained essentially unchanged from that recorded in 1966, but there was a considerable reduction in larval numbers and subsequent damage. The main infestation remains on the Targhee Forest; feeding was mostly confined to the smaller trees.

The predicted increase in white fir needle miner populations did not materialize; instead, the overall infestation level dropped to a new low. Black-headed budworm in association with spruce budworm populations were recorded in Douglas-fir and subalpine fir in one small area on the Caribou Forest. The predicted decline of a looper on white fir in Timpanogos Cave National Monument was so significant that late larval populations and subsequent defoliation were impossible to find.

Defoliation of Douglas-fir by the Douglas-fir tussock moth was not evident in 1967. Another tussock moth caused only negligible defoliation to young ponderosa pine in the Town Creek Plantation in southern Idaho. Tent caterpillars were abundant on Fremont poplar and a variety of range and browse plants throughout Utah. A mealybug continues its slow attrition of Engelmann spruce in two separate infestations in southern Utah. A terminal weevil has been deforming lodgepole reproduction

in separate localities in Idaho and Utah. Natural control factors were effective in subduing a serious outbreak of the pinyon pine sawfly in southeast Nevada. Grass plant bugs were numerous in natural and planted range areas in southern Utah.

BARK BEETLES

Mountain pine beetle, Dendroctonus ponderosae Hopk.

Lodgepole pine

The seemingly endless battle against the mountain pine beetle in lodgepole pine in the Intermountain Area continues, although there have been significant letups of beetle depredation in some areas and favorable signs of future decreases in others. Regionwide, the beetle has extended its boundaries, but the overall intensity of tree killing is on the decline. Nevertheless, massive tree killing of epidemic proportions continues on the Targhee Forest and in Yellowstone National Park in eastern Idaho and western Wyoming, on the Teton and Bridger Forests and in Grand Teton National Park in western Wyoming, and to a lesser extent on the Caribou Forest in eastern Idaho. Less spectacular but nonetheless important outbreaks continue to deplete lodgepole pine on portions of the Sawtooth Forest in southern Idaho and the Cache Forest in Idaho and northern Utah. The once damaging infestations on the Ashley and Wasatch Forests in southwestern Wyoming and northern Utah have remained at a tolerable level.

The destructive capabilities of the mountain pine beetle required direct control to minimize losses in stands under attack and to prevent losses in stands not yet under attack but ultimately threatened. Logging as both a short- and long-term control measure has been emphasized and undertaken whenever possible, but due to the magnitude of the infestation, inadequate logging and manufacturing capacity, and lack of sufficient established markets for lodgepole pine, removal of infested trees through logging did not contribute significantly to control. However, direct control continued to be necessary. In the Targhee outbreak more than 500,000 standing trees were chemically sprayed while an additional 50,000 trees were felled and burned or sprayed. The next largest control effort was on the Teton Forest where upwards of 91,000 infested trees were felled and burned or sprayed. Slightly over 3,100 trees were felled and sprayed in the Sawtooth infestation.

Easily the single most destructive infestation in the Region today is on the Targhee Forest. The infestation remains in the same general areas as recorded last year, from the Spencer District in the north, along the west bench of the Grand Teton Range, to the Swan Valley District in the extreme south. Increasing population pressure has extended the infestation boundaries to include the uppermost reaches of the eastern tributaries of the Snake River and the southwest corner of Yellowstone Park, and moved the infestation closer to the prime lodgepole stands in the Moose Creek Plateau.

Even though past control efforts reduced tree killing in and near the control areas, they did not check the impetus of the infestation or

halt its eventual spread into the lodgepole stands in nearby Yellowstone Park. Evaluation surveys in the control areas showed a buildup ratio of about one to one, meaning that there were as many new attacks as old ones. In adjacent noncontrol areas there were twice as many new attacks as new ones, or a buildup ratio of two to one. An intensive survey by Yellowstone Park personnel discovered over 18,000 newly infested trees in a 6,000-acre area in the extreme southwest corner of the Park. This was a threefold increase over that recorded in 1966. No control is planned for the Yellowstone infestation, at least not in 1968. In the Targhee infestation, in portions of the old control area and in other stands where beetle populations have increased, efforts are now underway to treat more than 400,000 trees in 1967-1968.

Considerably less pessimism is shown for the once spectacular infestation on the Rexburg District in the south end of the Forest and for the scattered infestations in the extreme north on the Spencer District. Considerably fewer redtops were recorded in these areas in 1967 and current biological conditions indicate a further weakening of the population level in 1968.

The catastrophic situation which has long persisted in the Jackson Hole country, but exhibited weakening symptoms in 1966, declined even further in 1967. The most significant reduction was in the Teton Wilderness where, just two years ago, upwards of one million trees were attacked and killed. A similar reduction occurred south of the Wilderness on the Teton Forest in the Buffalo and Blackrock drainages, but this was aided by persistent control work. Treatment of large tree groups is being continued, but with the present low infestation intensity (less than one tree per acre) and other favorable biological signs, it is possible that large-scale control efforts on the Teton Forest will be terminated in 1968.

The scattered infestations in the Hoback River drainage in the south end of the Teton Forest showed a general decrease with a marked decline occurring just outside the Forest boundary on BLM, State, and private holdings surrounding Kismet Peak and Signal Hill. Fresh attacks were virtually impossible to find and it is this infestation which harbored more than 50,000 infested trees in 1965, the year of peak killing. This, incidentally, is perhaps the most heavily depleted lodgepole stand in the Region today. Elsewhere on the Teton Forest, widely scattered infestations of considerably smaller scale continue to deplete lodgepole but they also show a declining potential.

In adjoining Grand Teton Park where only limited control was undertaken in 1967, approximately the same number of trees were attacked in 1967 as were killed in 1966, but the present infestation level is far below the peak reached in 1965. Static tree killing will continue in 1968.

Two altogether different situations exist on the Bridger Forest. In the Wyoming Division, scattered infestations along the lower reaches of the Greys River have begun to recede. Woodpeckering, competition from ips beetles, and other natural factors have materially reduced the number of new attacks in mixed stands in Grizzly Basin, Murphy Creek, and in other areas having long infestation histories. In the Bridger Division, along the west side of the Wind River Range, tree killing has increased in existing infestations and developed anew in others. The most damaging infestations are near or bordering the myriad lakes and other recreational areas skirting the pristine Bridger Wilderness. No letup in the present high rate of killing is forecast for 1968.

For the third consecutive year, heavy tree killing occurred in Stump Creek, Terrace Canyon, Crow Creek and in other areas of the Caribou Forest. Redtops will be as prevalent in 1968, but beetle populations and subsequent tree killing should wane thereafter. During the past five years, beetle populations have slowly but consistently depleted many of the mature and overmature lodgepole stands on portions of the Sawtooth Forest. Increased tree killing occurred in most areas with the most noticeable increase showing up along Warm Springs Creek west of Ketchum, Idaho. The widely scattered group-type infestations on the Cache Forest declined in 1967 and are expected to subside even further in 1968. Mixed lodgepole and ponderosa pine on the Payette Forest are threatened by a localized buildup of the mountain pine beetle on nearby State and private lands south of McCall, Idaho. The once serious infestations on the Ashley and Wasatch Forests that have been receding for the past two years, declined even further in 1967.

Although the apex of tree killing by the mountain pine beetle in the Intermountain Region has finally been reached, and fewer trees will be attacked in 1968 than in 1967, tree killing will nevertheless continue on a massive scale for several years to come. New outbreaks will emerge in previous beetle-free areas; some of the existing infestations will become more intense. Others will increase in scope; while still others, particularly abandoned control areas, may develop anew. Faced with this threat, the forest manager who feels that something should be done, other than to let the infestation run its course, has at his disposal only three control alternatives: (1) treatment of individual infested trees to destroy the brood; (2) accelerated harvesting of mature and overmature lodgepole pine; and (3) intensified logging combined with single tree control. We now realize that although single tree control may momentarily reduce beetle numbers and curtail immediate tree losses, it does not materially affect the beetles' innate capacity to increase; nor does it eliminate or appreciably change the underlying cause of the present epidemic--the maintenance of contiguous stands of mature and overmature lodgepole pine. As long as susceptible trees remain, the beetle will continue to kill singly or in groups until the stand is converted to a less susceptible state. The depletion of these stands is inevitable unless sound forest management objectives, including an extensive accelerated harvesting program, are quickly initiated and completed.

Ponderosa pine

Widely scattered killing of mature ponderosa pine occurred in portions of the Dixie Forest and Bryce Park. Although this infestation is not considered serious, it was difficult to evaluate because of extremely late beetle flights, the scattered nature of the infested trees, and failure of the infested trees to fade the year following attack. Killing of small tree groups occurred over a relatively large area south of Flaming Gorge on the Ashley Forest in Utah. The persistent infestation in stagnated second-growth ponderosa pine on private lands near Cascade, Idaho, which did not decline as expected, continued to kill between 2,500 and 3,000 trees in 1967. A lack of adverse biological factors and a supply of host trees suggests that as many trees will be killed in 1968.

Douglas-fir beetle, Dendroctonus pseudotsugae Hopk.

The full effects of a severe windstorm during the winter of 1964-1965 are now being realized throughout the Douglas-fir stands of southern Idaho. At that time, strong winds in the aftermath of drenching rains uprooted and snapped off thousands of Douglas-fir trees over a four-Forest area. This down material nurtured beetle populations which attacked standing trees in 1966, but were not detected until early 1967. Heaviest tree killing occurred in the southern parts of the Boise and Sawtooth Forests and on the west side of the Payette Forest. Efforts were undertaken to log as many of the infested trees as possible, but this was not practical in many areas because of the scattered nature of the material. However, several hundred infested and high-risk trees have already been removed from the Bogus Basin Ski area on State and National Forest lands near Boise, Idaho.

A hazardous situation resulting from infested logging debris--long butts, culls, and high stumps--exists in one sale area on the Challis Forest. Since the sale has terminated and fresh slash is no longer available, emerging beetles will undoubtedly attack nearby standing trees if the infested slash is not chemically treated or burned. Natural factors, combined with persistent logging of infested and susceptible timber, have reduced but not controlled the serious infestation in the Sublette Division of the Sawtooth Forest. Logging will be continued until serious tree killing ends.

Elsewhere in the Region, the status of Douglas-fir beetle populations is far less serious and should remain at that level for at least another year. Widely scattered tree killing occurred in portions of the Bridger, Caribou, and Cache Forests but well under the already low level of 1966. The serious infestation in southern Utah which reached a peak in the early 1960's and began to decline in 1963, has maintained a rather constant rate of decline since then. A few widely scattered infestation centers remain in the south end of the Fishlake Forest and

and on the west side of the Dixie Forest. Several large tree groups, far removed from any commercial Douglas-fir stands, persist in dry wash canyons on the Manti-LaSal National Forest west of Blanding, Utah.

Engelmann spruce beetle, Dendroctonus obesus Mann.

A breakdown in the detection system allowed a destructive Engelmann spruce beetle outbreak to go unreported, and consequently unchecked, in the Hilgard Mountain area of the Fishlake Forest. The unsuspected buildup was probably triggered by a late 1961 windfall that was checked and found free of spruce beetle in 1962 but maintained sufficient moisture to attract and nurture beetle populations in 1963. The broods developed successfully, emerged in 1965, and attacked fresh, scattered windthrow and standing trees. Since the beetle-killed spruce did not exhibit typical discoloration symptoms as do most other beetle-killed conifers, the infestation went unnoticed until discovered by aerial observers in 1967. Followup ground surveys showed the infestation to be epidemic with the largest infestation covering some 1,000 acres of inoperable spruce south of Hilgard Mountain. Smaller infestations of undetermined size and intensity exist near UM Pass and in the upper reaches of Burnt Hollow and Yogo Creek. In the Hilgard infestation it is probable that most, if not all, of the larger diameter spruce will be killed. Early summer surveys will determine the status of the other infestations and whether they pose a threat to other nearby operable spruce stands.

Engelmann spruce killed by the Engelmann spruce beetle. Although devoid of foliage and heavily woodpeckered, these trees harbor dangerous beetle populations. Beneath the remaining bark are hordes of mature beetles that will emerge in the spring and attack standing trees.

A potential threat to standing spruce now exists in the Hazard Lakes area of the Payette Forest where road construction in 1966 resulted in the scattering and

Mature spruce bark beetles hibernating under exposed bark of a dead Engelmann spruce.

piling of more than a quarter million board feet of spruce and fir timber along the right-of-way. Most of the spruce logs were heavily attacked by the spruce beetle, but because of additional road construction and adverse weather the logs were not removed. Since the beetles will fly sometime in May 1968 and snow conditions will preclude removal of infested and susceptible spruce, more than 700 trap trees will be felled in an attempt to keep attacking beetles concentrated near roads to facilitate logging of infested material.

Two relatively small infestations in standing trees in widely separated areas were detected by aerial observers on the Bridger Forest. The first involves approximately 75 to 150 dead spruce over a 500-acre area in Roaring Fork Creek; the second is a small group of 15 to 20 trees at the head of Dry Beaver Creek. The status of these infestations are unknown but both are in mixed type and distant from contiguous spruce stands.

Western pine beetle, Dendroctonus brevicomis Lec.

The widely scattered outbreaks in mature ponderosa pine in recreation areas on the Pine Valley District, Dixie Forest, were reduced by direct control. In the Oak Grove campground area, 50 brood trees were cut and removed. Some 350 trees were felled and sprayed with chemicals in Browse Creek, although several brood trees were left untreated. Another 25 trees were cut and sprayed in a continuing effort to subdue a light but persistent infestation in Pine Valley.

Although a minor component of a bark beetle complex, the western pine beetle was partly responsible for limited killing of ponderosa pine in the mountain pine beetle infestations near McCall, Idaho, and in southern Utah on the Dixie Forest and in Bryce Park. The fluctuating outbreak near Smiths Ferry, Idaho, on the Boise Forest, which declined to a tolerable level in 1966, maintained that status in 1967.

Pine engravers, Ips spp.

Ponderosa pine logging slash which did not dry out as expected during the winter of 1965-1966 reared a spring brood of ips that imerged and

extensively attacked large groups of young ponderosa pine throughout southern Idaho. The spring and summer of 1966 was unseasonably warm and dry which portended the widespread outbreak that followed. During the 1967 season the beetle populations in standing trees did not recede as quickly as expected and group killing of ponderosa pine continued in portions of the Boise, Payette, and Sawtooth Forest. Although the general infestation still remained high, group sizes became smaller which indicates a natural declining trend. With the absence of spring slash, this trend should continue through 1968. The troublesome infestation near the Ransack thinning area on the Salmon National Forest finally subsided in 1967.

Fir engraver beetles, Scolytus ventralis Lec. and Dryocoetes confusus Sw.

In past years it has been difficult to distinguish fir-engraver-caused mortality of true firs from mortality resulting from pathological and physiological causes. In some instances, although not always, Scolytus and Dryocoetes are secondary invaders which complicates the diagnosis even further. In any event, mortality of true firs in the Region in 1967 was at its lowest level in years. No significant killing of true firs occurred other than in a few widely reported areas on the Bridger and Fishlake Forests. In Timpanogos Cave a few white firs, Abies concolor, weakened by the 1965 flood, eventually succumbed to S. ventralis attacks in 1967. The infested trees were felled and burned.

Roundheaded pine beetle, Dendroctonus adjunctus Blandford

An unusually dry growing season in 1966 is believed to have preconditioned many ponderosa pine in the Spring Valley Mountains on the Toiyabe National Forest, northwest of LasVegas, Nevada, to attacks by Dendroctonus beetles. Although the mountain pine beetle, D. ponderosae, and the western pine beetle, D. brevicomis were present to some extent, the principle tree killer is thought to be the roundheaded pine beetle, Dendroctonus adjunctus. Attacks were widespread throughout the Las Vegas District, but the principle concern is the impact of this mortality in two highly developed and used recreation areas, Kyle and Lee Canyons, both of which are only an hour's drive from Las Vegas. Plans for 1968 are to fell and spray the brood trees sometime in July and to treat new attacks, if any, during November with cacodylic acid.

DEFOLIATORS

Spruce budworm, Choristoneura occidentalis

The usually heavy budworm populations infesting the Douglas-fir and true fir stands in southern Idaho are, for the present, a thing of the past. From a previous high in 1964 of more than two and a quarter million acres including more than one million acres of heavy defoliation, the infestation level dropped to less than 220,000 acres in 1967. In Idaho, mostly light and some moderate defoliation of decreasing intensity occurred in parts of the Boise, Payette, Salmon, Sawtooth, Challis, and Caribou Forests. Heavier and more recent budworm activity occurred on the Bridger, Targhee, and Teton Forests in western Wyoming while negligible feeding continued in one area of the Fishlake Forest in southern Utah. For a comparison of current budworm activity with that of past years, a tabulation of infested acreage by damage categories during the years 1962-1967 follows:

Year	Defoliation Intensity			
	Light (Acres)	Moderate (Acres)	Heavy (Acres)	Total (Acres)
1962	480,000	373,000	788,000	1,641,000
1963	357,800	276,600	988,800	1,623,200
1964	266,000	658,000	1,352,000	2,276,000
1965	465,600	254,500	795,200	1,515,300
1966	923,900	52,200	16,100	992,200
1967	162,200	54,900	1,600	218,700

The specific reasons for these significant reductions in budworm numbers and subsequent damage throughout southern Idaho are unknown, but there has been a sequence of fairly obvious factors, mechanical and biological, during the past few years that, alone or together, may have helped contribute to the present decline. During the buildup years, 1951 to 1964, close to three million acres of budworm infestations were controlled by aerial spraying including a final 525,000-acre spray project in 1964. This successful control effort was largely responsible for the sudden reductions in both intensity of defoliation and size of infested area in 1965. An analysis of egg mass counts that year indicated a resurgence of budworm activity in 1966, but a series of unexpected meteroro-logical events proved that prognostication wrong. Most all stages of the larval population were adversely affected, first by unseasonable freezes in the fall of 1965 following eclosion, and later during spring and early summer after hibernation had been broken. These late freezes not only killed many larvae but much of the new foliage growth as well. It is suspected that this caused even greater mortality, for many of the larvae that survived the freezing temperatures were suddenly confronted by a lack of food. This decline in the otherwise potentially high larval

population was so effective and so widespread that a planned 120,000-acre control project was promptly cancelled. Once the trend was established, it continued into 1967 where budworm activity reached its lowest level in a decade.

The most serious infestation in the Region today is the "Bridger" infestation which encompasses portions of the Bridger, Targhee, and Teton Forests. This outbreak was first reported on the Bridger Forest in 1965, increased somewhat in 1966, and spread onto the adjoining Targhee and Teton Forests in 1967. Light defoliation was recorded on the Teton and Targhee Forests while all levels of feeding were observed on the Bridger Forest. Heaviest defoliation was to Douglas-fir on the north side of the Snake River with lesser damage showing up in relatively open, mixed Douglas-fir-subalpine fir stands in high, inaccessible locations.

One small area of mixed spruce budworm-black-headed budworm activity was picked up for the first time in a mixed Douglas-fir-subalpine fir stand in the extreme south end of the Caribou Forest. One local area of light budworm activity is all that remains of a rather extensive outbreak on the Fishlake Forest in Utah. The full extent of spruce budworm activity in the Intermountain Region during 1967 follows. Its geographical distribution is shown in the appended map.

Defoliation Intensity

Forest	Light (Acres)	Moderate (Acres)	Heavy (Acres)	Total (Acres)
Boise	25,100	3,800	--	28,900
Bridger	19,500	30,700	1,600	51,800
Caribou	100	--	--	100
Challis	1,600	--	--	1,600
Fishlake	100	--	--	100
Payette	62,900	16,700	--	79,600
Salmon	25,600	--	--	25,600
Sawtooth	18,100	--	--	18,100
Targhee	6,300	3,700	--	10,000
Teton	2,900	--	--	2,900
TOTAL	162,200	54,900	1,600	218,700

What is apparent from this table, more so than the overall decrease in infested area, is the total absence of heavy defoliation, except for that on the Bridger Forest. This is the second consecutive year that stands with a long history of repeated, heavy defoliation, such as those on the Salmon and Challis Forests, will be completely free of heavy feeding. These areas and others in central Idaho now will have an additional year of recovery.

Because of the decling trend and the relative scarcity of defoliated area, considerably fewer egg mass plots were established in 1967. Egg mass sampling is undertaken, first to provide an index of population trend and subsequent defoliation, and secondly, as a supplemental survey method to detect the presence of budworm in what appears to be noninfested areas. These data, with few exceptions, portend an optimistic picture of the budworm situation in 1968. Throughout central and southern Idaho on the Payette, Boise, Challis, Salmon and Sawtooth Forests, infestation boundaries may shift somewhat, but defoliation will remain light, lighter perhaps than that recorded in 1967. Less optimistic predictions, however, are in store for the Bridger infestation where increased defoliation is expected for the second consecutive year in some areas, and unless unexpected natural factors intervene, the infestation will likely spread into previous budworm-free areas. Damage will not be so severe that control will be needed, at least not in 1968. The status of the new infestation on the Caribou Forest is unknown, but the small infestation on the Fishlake Forest, already at a low level, should maintain that status through 1968.

On the Sawtooth Forest, a pilot test was undertaken to evaluate the effectiveness of a carbamate insecticide, Zectran, against the spruce budworm when sprayed in minute doses (one-half ounce per acre) from specially rigged aircraft. Because of exceedingly low prespray population densities and unforeseen problems with aircraft and spray equipment, the results were inconclusive. Nevertheless, Zectran still shows promise as an effective control agent, and much was learned on the function of low volume spray equipment and the effects of local atmospheric conditions on droplet size and distribution. As to side effects, Zectran showed no adverse effects on aquatic insects, fish, or terrestrial animals.

Sugar pine tortrix, Choristoneura lambertiana (Busck)

Systematic egg mass collections of this defoliator were made for the first time in 1966 as one part of a continuing study to learn something of the biology and habits of this insect and its effect on lodgepole pine in the Intermountain Region. Since this was the first and only collection, and comparative data from other times and places and with various population levels were lacking, it was naturally felt that credible predictions as to population trend and subsequent defoliation in 1967 simply could not be made at that time. Nevertheless, egg populations (compared to egg deposition of a related defoliator, the spruce budworm) were extremely light which correlated closely with the population level and defoliation which actually occurred. The overall intensity of damage was so light that almost none was observed or recorded during the aerial survey. Although followup ground examinations substantiated this light feeding activity, no change in its distribution from that reported in 1966 was found.

Widespread but considerably lighter defoliation persists on the Targhee Forest from west of Bishop Mountain in the north, along Big Bend Ridge, and south along the lower west slope of the Grand Teton Range to Teton Creek. None to very little defoliation was observed in the larger trees. In the smaller trees, feeding was confined to the new growth and centered in the more exposed vertically oriented terminal and lateral leaders. This feeding pattern appears to be characteristic of this insect when their numbers are few. Light defoliation of understory lodgepole continued for the second straight year in Fall and Coburn Creeks on the Teton Forest and in localized, widely separated areas on the Bridger and Caribou Forests.

Although this defoliator has been active in lodgepole stands in the northern part of the Region for many years, it has yet to cause significant damage except in isolated areas. In some instances, particularly in slow-growing lodgepole on exceptionally poor sites, repeated heavy feeding will kill lateral as well as terminal leaders, causing forking and deformation. Even though cessation of feeding activity will allow these trees to recover, it is questionable whether they will ever produce merchantable sawlogs. Although only a preliminary observation at this time, it appears that in faster growing trees on good sites, multiple branching seldom occurs. It is also assumed that repeated defoliation may retard growth and predispose the weakened trees to attacks by other insects. At the present time, however, the level of damage is not severe enough to warrant direct control measures.

Tent caterpillars, Malacosoma spp.

A tent building caterpillar, Malacosoma sp. on Fremont poplar was active in southern Utah but considerably under the high population level of 1966. Widely scattered defoliation of generally light intensity was observed along the Virgin River valley from the Arizona border, east into Zion National Park. Moderate defoliation of individual trees still persisted in and near the communities of Toquerville and Rockville and to a much lesser extent in Zion Park. In the Park, mistblower application of a commercial preparation of Bacillus thuringiensis against young larvae in April minimized the likelihood of defoliation in the campgrounds and other visitor areas.

There is almost no possibility of an immediate return to the previous high population levels, at least not in 1968. As in the past, defoliation intensity will vary from tree to tree and from area to area, but the overall population densities should not exceed the present low level. Control may be necessary in the heavily used South Campground in Zion Park to prevent noticeable defoliation, to reduce the number of unsightly tents, and to minimize the nuisance factor of migrating caterpillars.

An unusually wet spring presumably was one factor responsible for a sudden upsurge of tent caterpillars in others areas of Utah. Heavy

populations of Malacosoma sp. severely defoliated more than 1,000 acres of bitterbrush, Purshia tridentata, and other range and browse plants on the Monroe unit of the Fishlake Forest. Bitterbrush is an important range plant because it is palatable to most animals and provides forage a month longer than associated plants on the same site. Heavy egg mass deposition and a high percentage of hatch in the laboratory indicate that even greater damage will occur in 1968. If biological factors do not intervene, and there is no indication that they will, foliar protection will only be obtained by chemical spraying.

Populations of the forest tent caterpillar, Malacosoma disstria, were widely scattered through portions of the Cache and Caribou Forests. Bigtooth maple and chokecherry were the preferred hosts, but damage was neither severe nor extensive enough to cause concern. The status of this insect is unknown.

Black-headed budworm, Acleris variana (Fernald)

Mixed black-headed budworm and spruce budworm populations were detected in one small area in Joes Gap on the Caribou Forest. This defoliator complex caused only light defoliation of Douglas-fir and subalpine fir. This is only the second known occurrence of the black-headed budworm on the Caribou Forest; the first was from an incidental collection from subalpine fir in Della Basin, August 1965.

A looper, Nepytia freemani Munroe

Populations of a looper, Nepytia freemani Munroe, were practically nonexistent in 1967. This young larva is on a needle of white fir, Abies concolor, its preferred host in Utah.

The short but spectacular outbreak of this geometrid on white fir and Douglas-fir in Timpanogos Cave and the Uinta National Forest declined as predicted. In May, following egg hatch, a few young larvae were seen on an occasional tree, but shortly thereafter no insect activity was observed during the remainder of summer. The reasons for this sudden and expected decline is thought to have resulted from starvation followed by extremely heavy parasitism by an ichneumonid wasp, Phobocampe sp. (new species). This parasite is especially interesting for after developing in the host

larvae, it forms a capsule-shaped cocoon, drops to the ground, and periodically jumps like the Mexican jumping bean moth.

In areas where populations were exceptionally heavy and where some trees were almost totally stripped of foliage, many trees are making a surprising comeback following a respite from looper feeding. Although some top and twig kill occurred, it was far less than expected, and most trees put forth new growth in 1967 and are expected to continue putting forth even more new growth in 1968. No looper activity is expected in 1968.

A sawfly, Neodiprion edulicolus Ross

A sawfly, Neodiprion edulicolus, is an enemy of pinyon pine in southeast Nevada. Here nearly full-grown larvae feed in typical gregarious fashion.

Natural factors, including unseasonal frosts supplemented by a host of Hymenopteron and Dipteron parasites, effectively reduced sawfly populations. As a result the extent of defoliated pinyon pine in southwestern Nevada decreased from more than 250,000 acres in 1965 to less than 50,000 acres in 1967.

Pupal collections made in the duff layer beneath the affected trees have proved to give a reliable index of future trend. A reduction in 1966 pupal counts, over that recorded in 1965, suggested a decline in the 1967 populations which did occur. Accordingly, a still further reduction in the abundance of 1967 pupae indicates an even greater decrease in sawfly numbers and subsequent defoliation of pinyon pine in 1968.

White fir needle miner, Epinotia meritana Hein.

The predicted increase in needle miner populations in portions of the Dixie Forest and Bryce Canyon National Park did not occur; instead the infestation declined to one of its lowest levels in years. Trees that were badly damaged just two years ago showed very little defoliation in 1967. Evidently, natural factors of unknown origin last winter and spring were effective in reducing the relatively high 1966 population level to a more tolerable status in 1967. Forecasts of expected population abundance and damage will be made in the spring of 1968, for predictions based solely on fall evaluations have proven to be unreliable.

Tussock moths, Hemerocampa spp.

Tussock moth (Hemerocampa sp.) activity on ceanothus and young planted ponderosa pine in the Town Creek Plantation on the Boise Forest continued at a low level for the second straight year. In prior years when tussock moth populations were high and larvae were starved of their preferred food, ceanothus, they would migrate to the nearby pines and, in some cases, cause serious defoliation. In 1967, as in 1966, light larval populations remained in the ceanothus and only occasional light feeding on ponderosa pine occurred. An increase in the number of overwintering egg masses, however, indicates a potential for increased activity in 1968. Followup surveys will be conducted in the spring and early summer to determine the presence and extent of a native polyhedrosis virus which has been a controlling influence.

A localized infestation of the Douglas-fir tussock moth, Hemerocampa pseudotsugae McD., has been active in Douglas-fir stands on BLM lands in Owyhee County, Idaho, since 1958. This infestation, which is noted for its abrupt population changes, is now at an all-time low. Its status for 1968 has yet to be determined.

A spruce mealybug, Puto sandini

Spruce mealybug populations continue their slow and insidious attrition of Engelmann spruce in two separate infestations in southern Utah. The first and most damaging infestation covers several thousand acres of mature and overmature spruce on Thousand Lake Mountain on the Fishlake Forest. The second infestation, equally extensive, but far less serious, is on the Aquarius Plateau on the Dixie Forest. Since the discovery of the mealybug in 1939 on the Fishlake Forest, heavy populations are suspected of having killed some suppressed and intermediate trees and are known to have killed the lower branches of larger trees. In the Dixie infestation, mealybug populations are extremely light, and other than causing slight foliage discoloration, no noticeable permanent damage has occurred. No significant changes in the present trend are foreseen for 1968.

OTHER INSECTS

A terminal weevil, Pissodes sp.

The change in emphasis from single tree control of the mountain pine beetle to accelerated logging of lodgepole pine will undoubtedly present us with new and challenging insect problems. The rapid conversion of large areas of mature and overmature lodgepole to thousands of acres of relatively even-aged reproduction will create a new and favorable environment that hitherto did not exist. Root insects, tip and shoot moths, sawflies, twig and terminal miners and other reproduction insects that are endemic now will most likely be important factors in the future management of these stands. Only by being aware of this potential, and planning now by gaining an understanding of these insects, their biologies and their impact on a growing crop, will we be in a position to suggest effective control measures when and if they occur. One insect that may affect the future management of lodgepole pine is a terminal weevil, Pissodes sp., which has been epidemic for the last two years in areas of natural reproduction on the Sawtooth Forest and to a lesser degree, on the Ashley Forest. Weevil damage decreased somewhat on the Ashley Forest but remained at essentially the same level on the Sawtooth Forest. On the Sawtooth Forest, heaviest terminal damage to reproduction occurred between Alturas and Pettit Lakes in the proposed Sawtooth Recreation area. An administrative study is proposed to determine the effects of this weevil on tree form and quality and to gain some insight into its biology and habits.

Grass plant bug, Labops hesperius Uhler

Although this and other grass bugs have been active in range areas in Utah for several years, it is only recently that they have become a serious problem in the National Forests. Since 1965, when some 400 acres of crested wheatgrass in the Assay Bench seeding area on the Dixie Forest was treated by chemicals, the infestation has increased in intensity and area and now encompasses more than 70,000 acres of National Forest rangelands. More than 60,000 acres of the present infestation are in 22 separate areas of the Dixie Forest with the remaining infested acreage scattered throughout portions of the Uinta and Cache Forests.

In early June, an aerial pilot test using two chemicals, malathion and dibrome, was directed against heavy grass bug populations in four seeding areas along the East Fork of the Sevier River on the Dixie Forest. The test was planned and conducted by the Agriculture Research Service. Observers reported that the malathion plots produced heavier kill than the dibrome plots, but the overall effectiveness has yet to be reported. The future status of this and other grass bugs in Utah is unknown.

FOREST DISEASES

By Alfred C. Tegethoff

Dwarfmistletoe, Arceuthobium spp.

The Regional Handbook on Dwarfmistletoe Control has been written and approved.

Dwarfmistletoe infections in ponderosa pine were subjected to control in two areas on the Dixie Forest. A total of 592 acres were treated at an average cost of $0.35 per tree. All work was done with force account crews.

A survey of location and incidence of dwarfmistletoe infection on prospective timber sales on the Manti-LaSal Forest was continued in C.Y. 1967. A total of 16,300 acres was surveyed at a cost of $0.27 per acre. The method is effective and Forest personnel feel that the data is useful for future planning of mistletoe control on timber sales. On the Salmon Forest, 21 acres of noncommercial Douglas-fir, stagnated due to heavy dwarfmistletoe infection, were burned standing. Excellent control was achieved.

Some preliminary tests of systemic herbicides in the summer of 1967 have shown promising results in selectively killing dwarfmistletoe without affecting the host trees. On the basis of this work, an administrative study plan has been prepared describing a formal test of a number of these systemic herbicides which show the most activity. The study plots will be established on the Toiyabe, Dixie, Salmon, and Cache Forests during the summer of 1968.

Fomes annosus

Fomes annosus was found in a number of new locations this year. In the Mammoth Ridge area on the Dixie Forest in which a timber sale was conducted in 1956, dead and dying ponderosa pine and juniper were found. On the Ice Caves Timber Sale, extensive kill of white fir and some ponderosa pine reproduction was noted.

On the Toiyabe Forest, extensive kill of Jeffrey pine was found in the Hope Valley area. Two large infection centers were found in the proposed Bootleg Campground. In each case, positive identification of F. annosus was made.

Two infection centers were found on the Manti-LaSal Forest in ponderosa pine, one just off the Butts Point Road, the other at the north end of the Bulldog Sale. In both cases, ponderosa pine trees were being killed. In the Butts Point center only three pole-sized trees had been killed to date while in the Bulldog center, reproduction as well as sawtimber-sized trees had been killed.

White pine blister rust, Cronartium ribicola

We assumed responsibility for all phases of blister rust detection and control in Region 4 formerly handled in Region 1. The work in this field will primarily be detection.

DISTRIBUTION OF MAJOR FOREST INSECT INFESTATIONS IN REGION 4
1967

LEGEND

- *Mountain Pine Beetle*
- *Douglas-fir Beetle*
- *Engelmann Spruce Beetle*
- *Spruce Budworm*
- *Pinyon Pine Sawfly*

Based on aerial and ground surveys

DIVISION OF TIMBER MANAGEMENT

FOREST SERVICE

U. S. DEPARTMENT OF AGRICULTURE

SCALE *miles* 0 40

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